

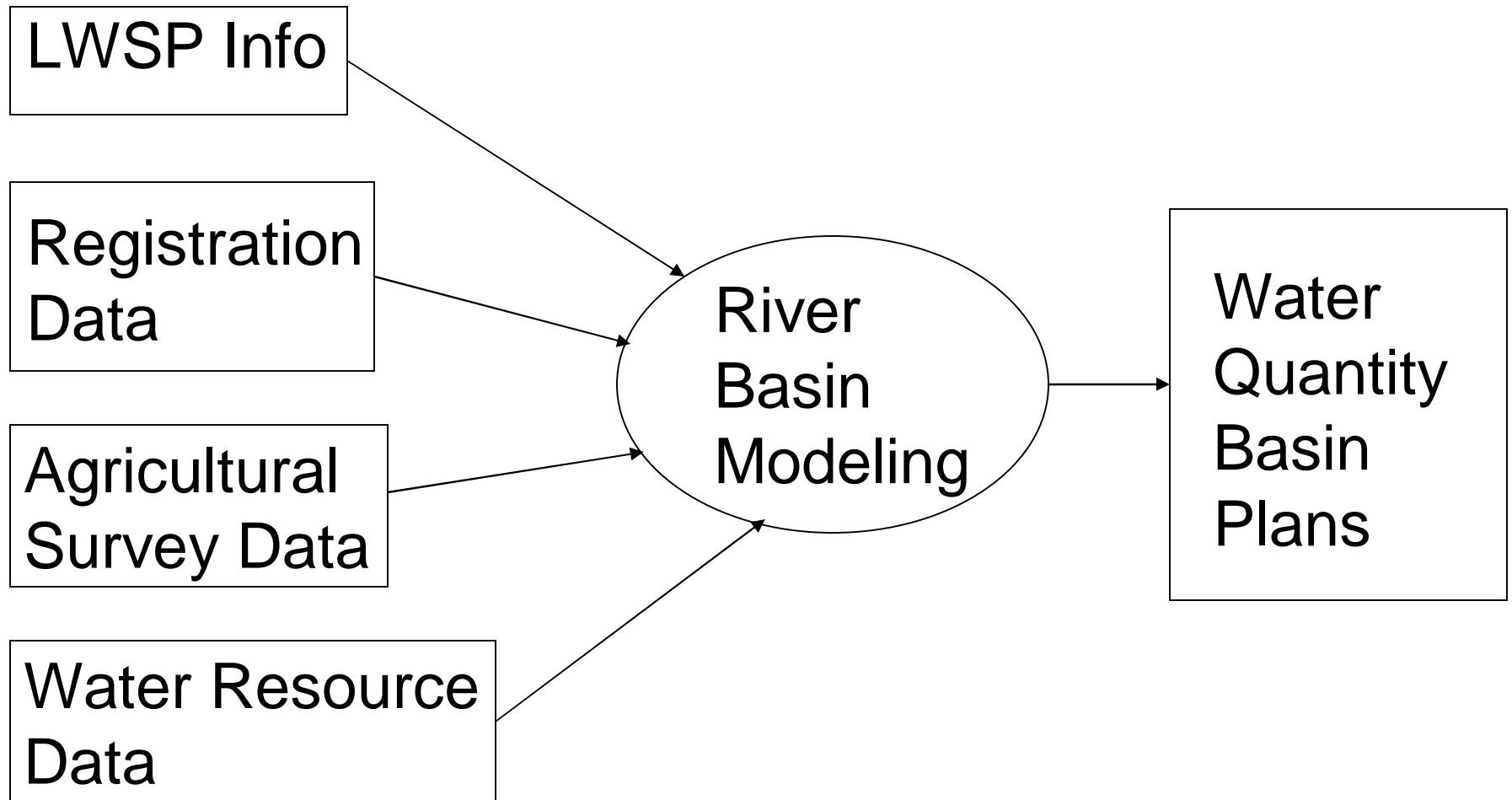


Water Supply Planning in North Carolina

Environmental Review
Commission

December 17, 2009

Data + Modeling & Analysis = Plans



Data Sources

- Local Water Supply Plans (LWSPs)
- Water Withdrawal Registration Data
- Agricultural Water Use Survey Data
- Water Resources Data
 - State Ground Water Network
 - USGS
 - State Climate Office

Local Water Supply Plan Program

- 1st plans submitted in 1990.
- An assessment of a water system's current & future needs and its ability to meet those needs.
- Required for:
 - Units of local government
 - Community water systems with > 1,000 connections or serving > 3,000 people.
- Updated every 5 years.
- Annual water use reporting

Local Water Supply Plan Program

- Plans are submitted electronically.
- Reviewed and approved by NC DWR.
 - New requirement in 2008 Drought Bill.
- Data essential for river basin models.

Local Water Supply Plan Program

- Complete plan includes:
 - System Information
 - Water Use Information
 - Water Supply Sources
 - Wastewater Information
 - System Planning and Projections to 2050.
 - Water Shortage Response Plan
 - For managing water use during times of water shortages.

LWSP 80% Guideline

- When average daily demand is projected to exceed 80% of a system's available supply by 2030.
- Systems are asked to evaluate options such as:
 - Enhanced demand management and efficiency
 - Additional source of water
 - Interconnection, additional wells, surface water intake, etc
- Describe plan in LWSP
- DWR Staff reviews proposed plans for new supply to determine if water will be available.

Withdrawal Registration & Reporting Program

- Non-ag withdrawals >100,000 gpd required to register.
- Ag withdrawals >1,000,000 gpd required to register.
- Applies to surface and ground water withdrawals.
- Annual reporting of water use for registered users.
 - Requirement of 2008 Drought Bill.
- Local Water Supply Plan meets requirement.

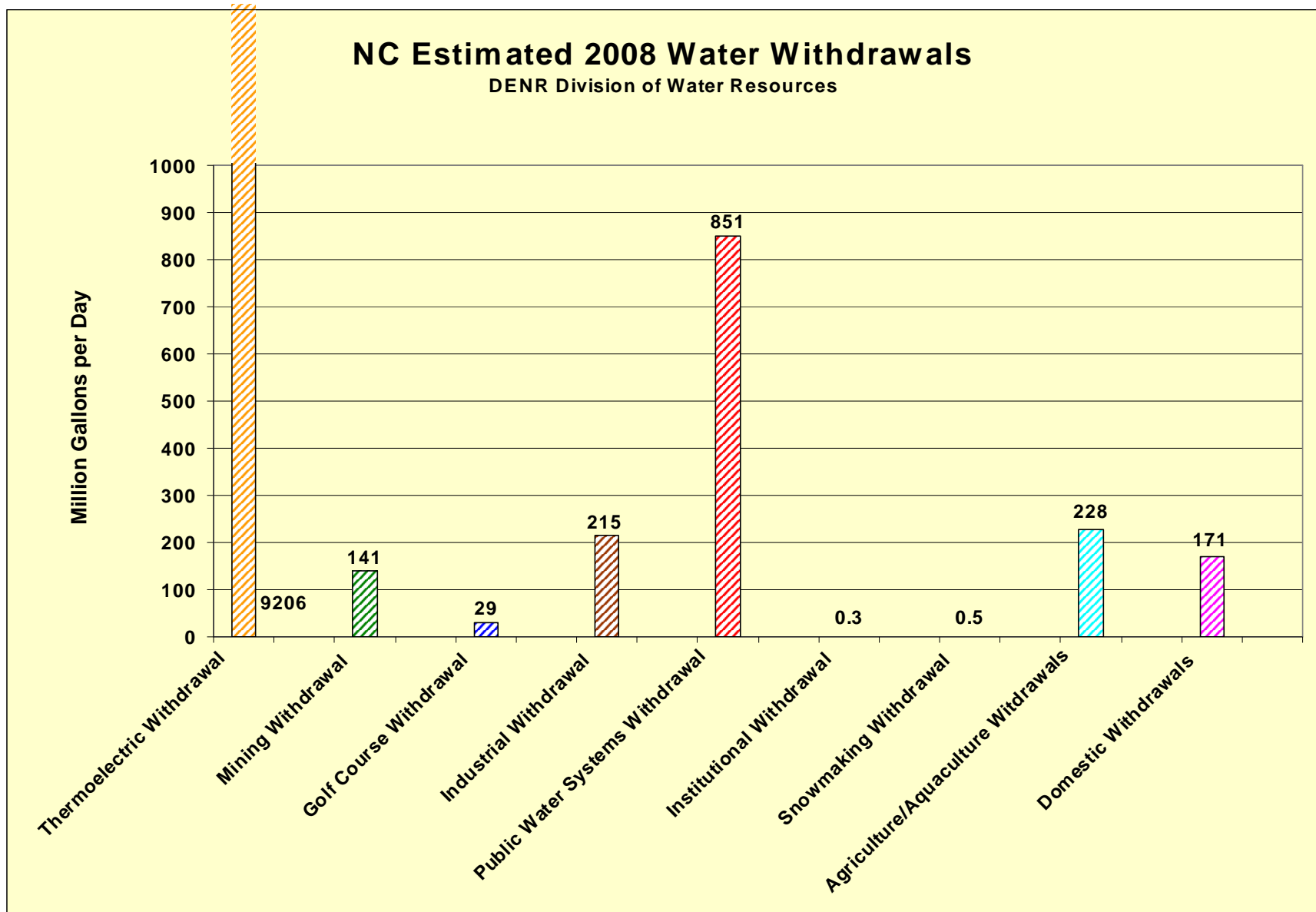
Agriculture Survey

- New requirement in 2008 Drought Bill.
- Conducted by Dept of Ag & Consumer Services
- Survey of ag users > 10,000 gallons per day.
- 86% response rate.
- Results of 1st Survey submitted July 1, 2009.
- Contains information & data previously unavailable.
- In 2008 agricultural water use exceeded use by large community and local government water systems in July and August.

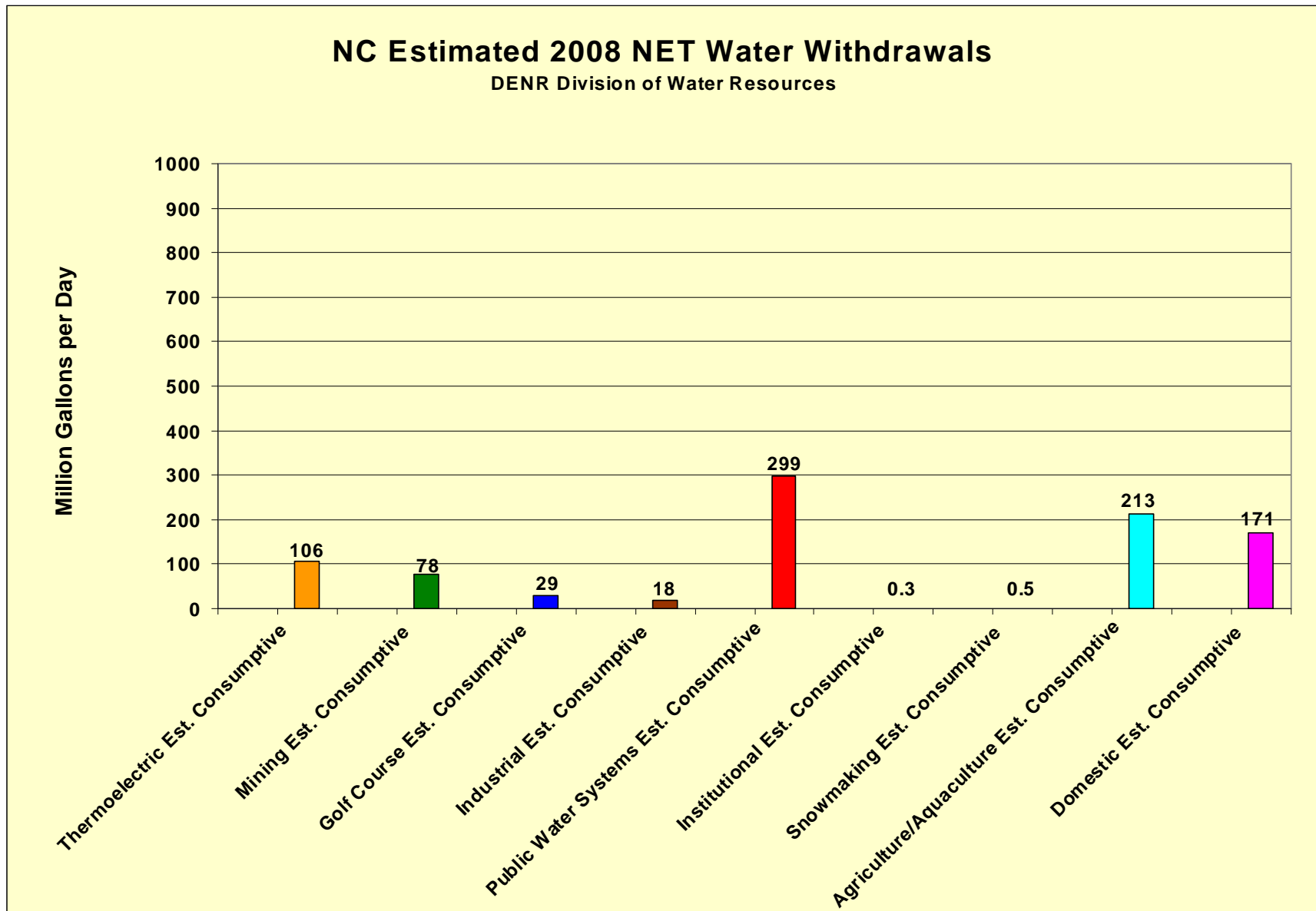
Water Resources Data

- State Ground Water Network
 - DWR monitors 561 wells across the State.
- NC – USGS Cooperative Program
 - Monitor 68 real-time stream flow gages.
 - Monitor 16 real-time wells.
- State Climate Office
 - Integrated database of streamflow, ground water levels, and climatic data.

Average Daily Withdrawals



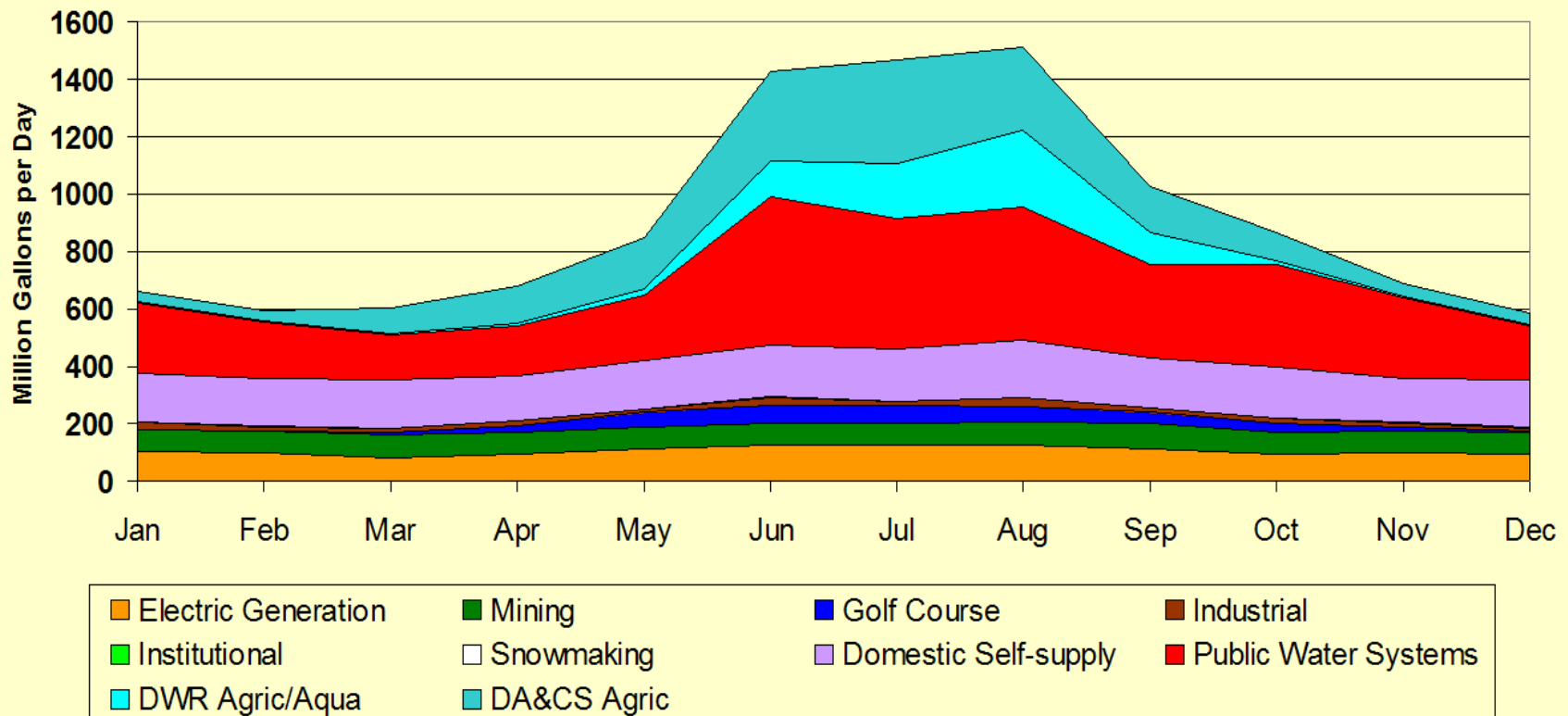
Average Daily Net Withdrawals – Consumptive Use



Monthly Average Daily Net Withdrawals

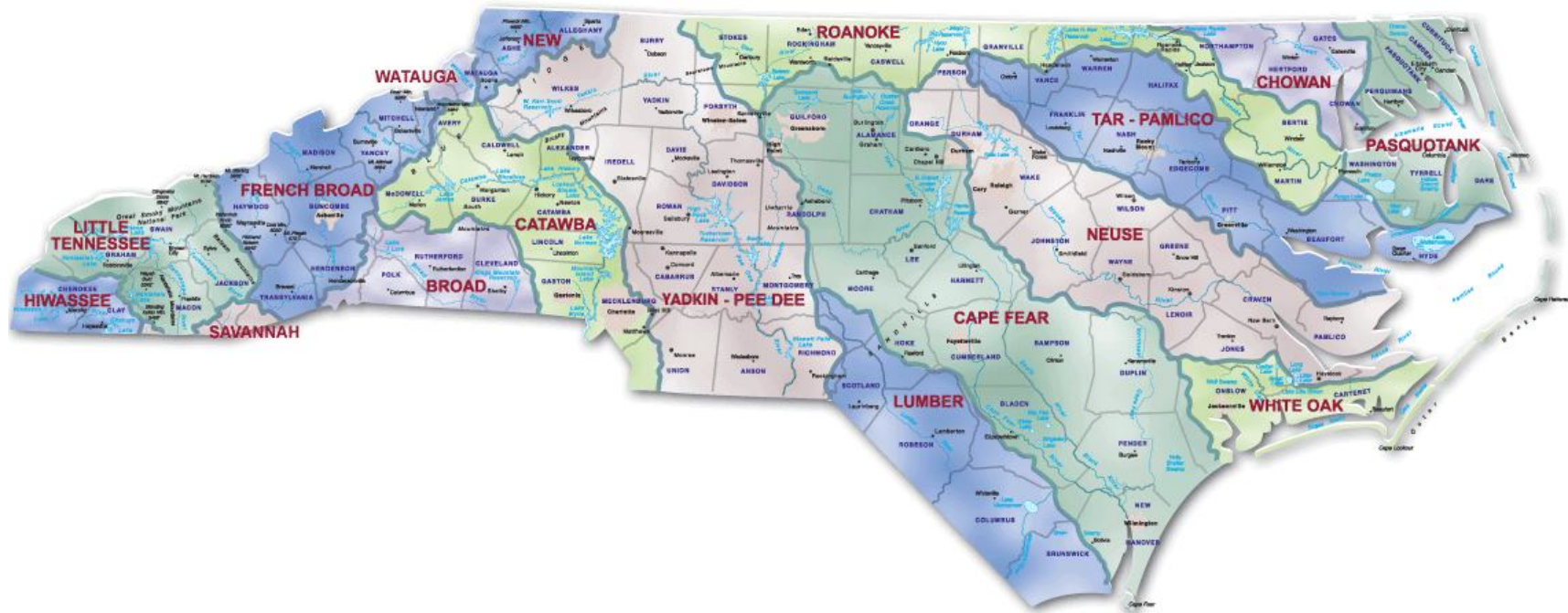
NC Estimated 2008 Net Water Withdrawals

DENR Division of Water Resources



River Basin Modeling

- Basin by basin approach.
- One of the most sophisticated programs in SE.
- Provide science based tools to study water management.

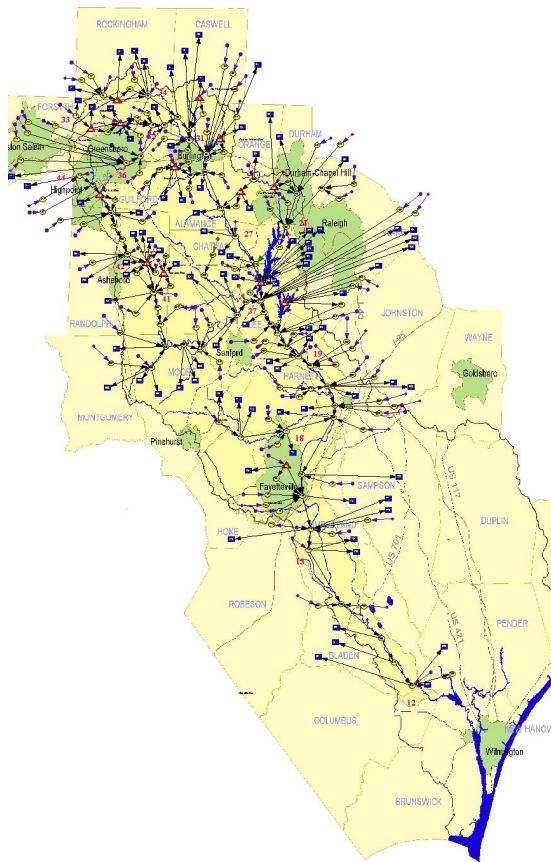


River Basin Model Basics

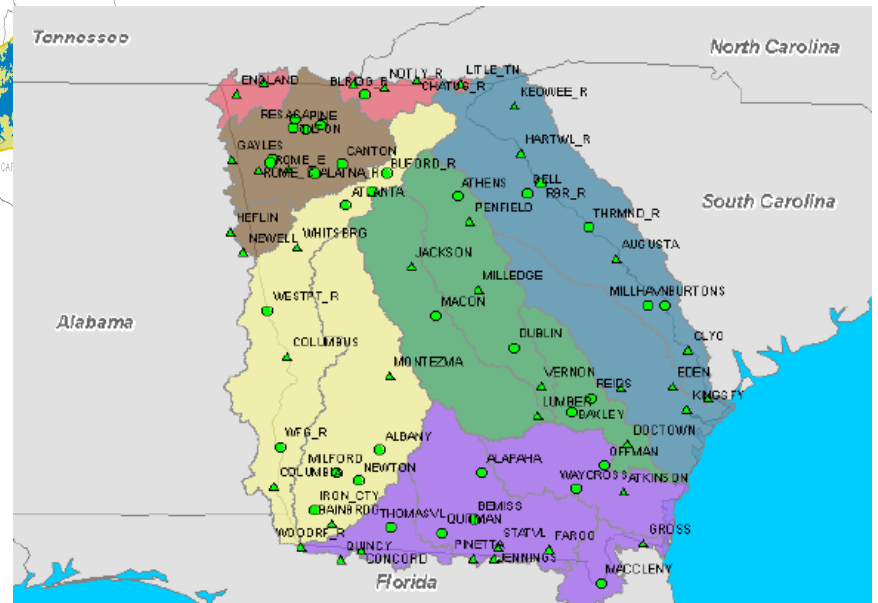
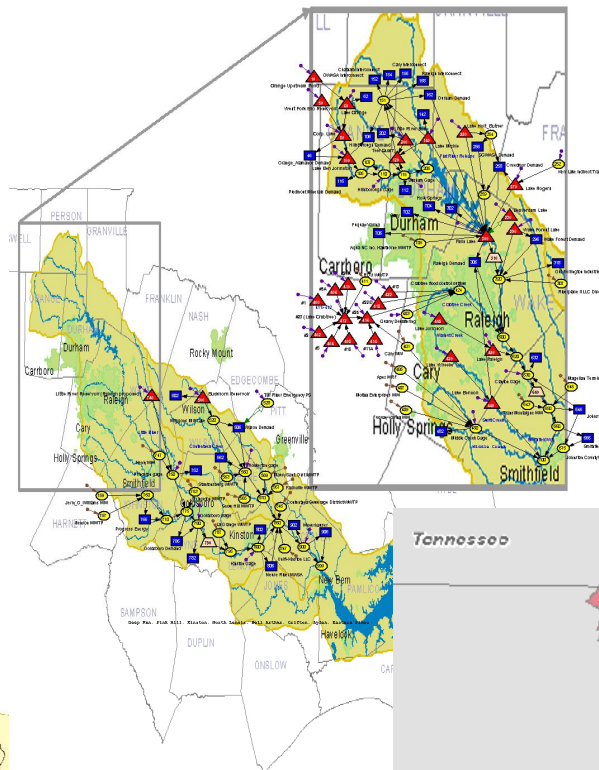
- Water Balance Model
 $\text{Inflow} - \text{Outflow} = \text{Change in Storage}$
- Model is like a checkbook
 $\text{Natural Inflow \& WW Discharges} = \text{Salary}$
 $\text{Outflow \& Withdrawals} = \text{Expenses}$
 $\text{Storage} = \text{Bank Account}$
- Calculated at many locations in basin.
- The complexity is developing the data and equations to describe the 3 variables.

NC – GA Model Comparison

Cape Fear River Basin Schematic



NEUSE RIVER BASIN SCHEMATIC



Practical Applications of Modeling

- Determine the impacts of new & existing water withdrawals and wastewater discharges.
- Determine potential shortfalls based on projected uses detailed in Local Water Supply Plan.
- Scientifically defensible means of generating daily stream flows for ungaged stream segments.
- Safe yield estimates for run-of-the-river intakes and water supply impoundments.
- Develop and test drought management plans.

Schedule for Models Underway

Cape Fear	Update – 12/2010
Neuse	12/2009
Roanoke	Update - 6/2010
Tar-Pamlico	6/2011
Broad	6/2011

River Basin Plans

- River Basin Plans are the final product of process.
 - Provide analysis of model output.
- Information needed for long range planning.
- Similar to DWQ Basinwide Plans.
- DENR goal to better coordinate and integrate DWR & DWQ Basin Plans.

Schedule for Basin Plans Underway

Cape Fear	Revised – 6/2011
Neuse	6/2010
Roanoke	6/2011
Tar-Pamlico	6/2012
Broad	6/2012

Benefits of Planning Program

- Highlights potential problems or shortfalls in future.
 - Identifies areas where demand may exceed supply.
- Resolution of potential conflicts over water sources.
 - Multiple systems over-using a single source.
 - Competition for water during droughts
- Provides local governments a valuable planning tool.
 - Raleigh, Jordan Lake Partners, IBTs, etc...
- SEPA Cumulative Impact Analysis

What if there is not enough water?

- Projected demand greatly exceeds available supply.
- Opportunity for local solutions:
 - Comprehensive conservation & greater efficiency.
 - Joint ventures / regional solutions.
 - New sources, interconnections, IBTs, etc...
- One regulatory option currently available:
 - EMC designates area a “Capacity Use Area” (CUA)
- One area in State already designated as CUA:
 - 15 Counties in Central Coastal Plain CUA.

Challenges of Current Program

- Incorporation of Ecological Flows.
 - How much water needs to be left in the river?
 - Not a single number – a seasonal flow regime or hydrograph.
 - Complex issue for all States to address.
- Incorporation of groundwater impacts.
- Ensure model outputs reflect reality.

Value of Regional Water Supply Planning

	Total savings per mgd	Annual Net benefit per household	B/C Ratio
Atlanta	\$1.48	\$3.83	2.0
Boston	\$3.45	\$28.92	1.8
Seattle	\$1.06	\$6.95	2.1
Phoenix	\$1.76	\$10.32	4.3
Houston	\$10.33	\$14.44	1.7
Median	\$1.76	\$10.32	2.0

Data + Modeling & Analysis = Plans

- One of the most sophisticated programs in SE.
- Accomplished with a minimal amount of resources.
- Need to incorporate ecological flow regimes.
- Process constrained by existing staff resources.

Questions?

Contact Information:

Tom Reeder

919-715-3045

tom.reeder@ncdenr.gov

